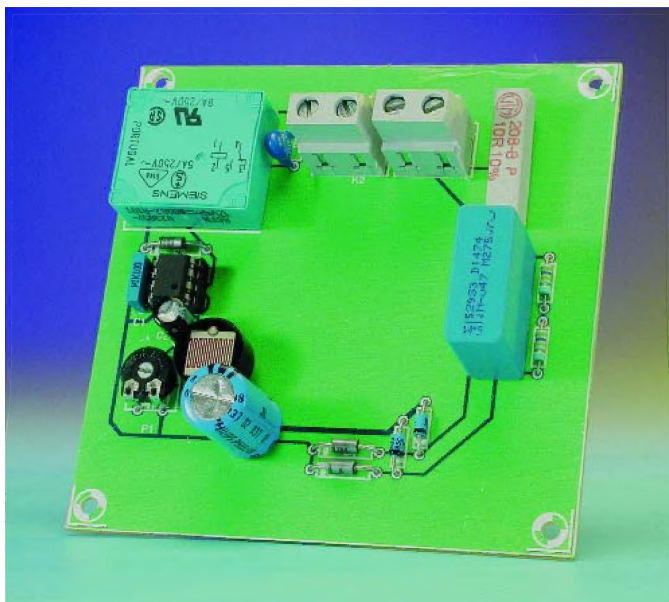
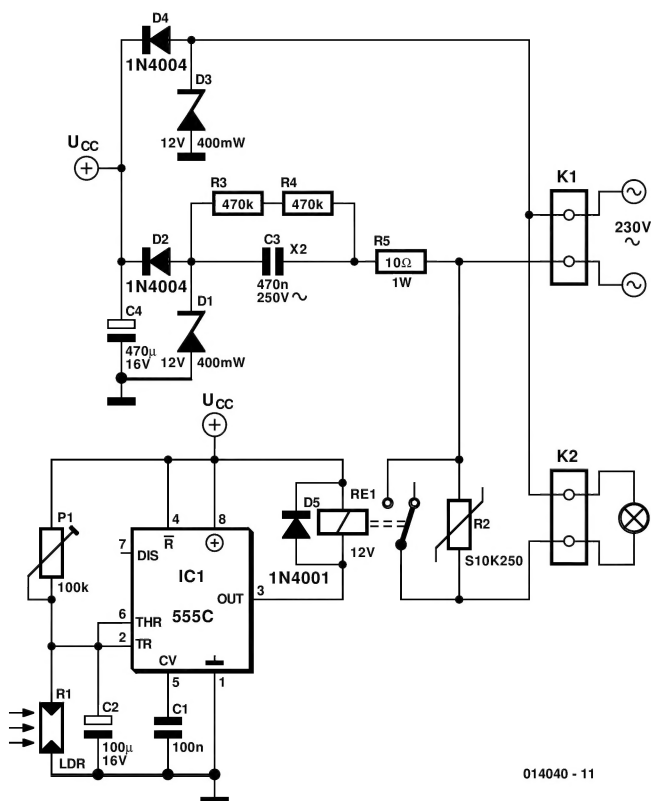


Twilight Switch

002



Nowadays, you do not actually need to build twilight switches yourself, since they can be purchased quite inexpensively. However, if you enjoy doing so and you perhaps already have the parts on hand (cannibalised from a ready-made unit?), then who's to stop you? In addition, if you do it yourself you have the unique opportunity to make some-



thing that exactly matches your own taste and wishes.

Building a twilight switch is certainly not difficult, as is illustrated by the design presented here. It uses the well-known 555 IC (here in the economical CMOS version), which has a trigger input with hysteresis ('on' at 2/3 of the supply voltage, 'off' at 1/3) and an internal flip-flop as a memory element. The 555 output can switch up to 100 mA, which is adequate for driving a relay. When it becomes dark, the resistance of the LDR (R1) increases and the voltage on pins 2 and 6 of the 555 rises. When it reaches 2/3 of the supply voltage level (which depends on the setting of P1), the relay is engaged and the load is switched on.

Since relay contacts are used for switching, the load can also be inductive (which means that you can also connect an energy-saving (PL) lamp or a halogen-lamp trans-

COMPONENTS LIST

Resistors:

R1 = LDR
R2 = S10K250 varistor
R3,R4 = 470Ω
R5 = 10Ω 1W
P1 = 100 k preset H

Semiconductors:

D1,D3 = zener diode 12V
 1W
 D2,D4 = 1N4004
 D5 = 1N4001
 IC1 = 555C

Capacitors:

C1 = 100nF
C2 = 100μF 16 V radial
C3 = 470nF 250VAC,
class X2
C4 = 470μF 16V radial

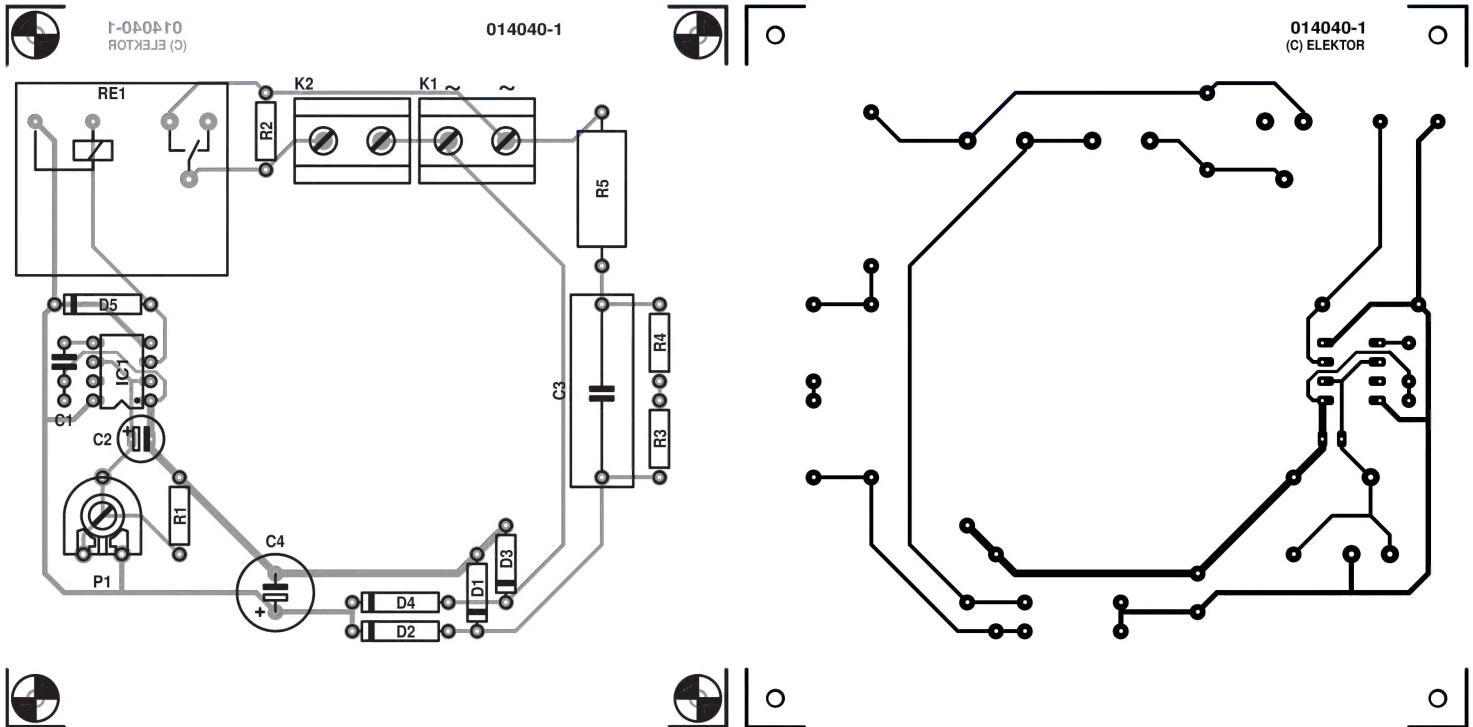
Miscellaneous:

Rel = 12-V-relay, e.g.,
Siemens V23057-A2-A101
K1, K2 = 2-way PCB
terminal block, lead pitch
7.5 mm

former). Although the relay can switch up to 4 A, it is a good idea to keep the load current under 1 A, since the tracks on the circuit board cannot handle more than this. The circuit board layout shown here is anyway intended primarily as an example. Space for the lamp fitting has intentionally been left in the middle of the circuit board.

Since the circuit is connected to the mains network, you naturally have to give suitable regard to safety when fitting it into a fixture. With an earthed fixture, ensure that the insulation clearance is at least 3 mm; for non-earthed fixtures it must be at least 6 mm. Also fit a cover plate, to prevent accidental electrocution when replacing the bulb. Always switch off the mains voltage before using P1 to adjust the light sensitivity!

In many cases it will be necessary to provide a small (watertight!) window for the LDR, such that daylight can fall on it but it is screened from the light of the lamp. The shell of a pilot lamp can often be used for this purpose. Use a medium-sized, encased LDR (approximately 1 cm diameter). Without a case, the LDR would not be able to achieve



high enough resistance in damp weather.

The relay is a Eurocard type with a coil voltage of 12 V. It draws around 37 mA. A 230-VAC VDR is connected across the contacts. This is a voltage-dependent resistor that acts somewhat like a bi-directional Zener diode and suppresses

voltage spikes when the load is switched off. Larger or smaller types can also be used, as long as they are suitable for 230-V operation. An S5K250 or S20K250 could thus be used instead.